

3/15/18

"Experience enables you to recognize a mistake when you make it again."-Franklin P. Jones

HW: "Exponential Functions Basics" homework section
 Test 3 Wednesday 3/28

AIM: What are Exponential Functions?

Warm Up:

1. If $f^{-1}(x) = \frac{1}{3}x + 7$ then which of the following is the correct formula for $f(x)$?

(1) $f(x) = -\frac{1}{3}x - 7$

(3) $f(x) = 3x - 7$

(2) $f(x) = 3x - 21$

(4) $f(x) = -3x + 21$

$$y = \frac{1}{3}x + 7$$

$$y = \frac{1}{3}x + 7$$

$$x = \frac{1}{3}y + 7$$

$$\left(\frac{3}{1}\right)x - 7 = \frac{1}{3}y \left(\frac{3}{1}\right)$$

$$3x - 21 = y$$

$$f(-3) = -7$$

2. The function $f(x)$ is an odd function with $f(3) = 7$ and $f(9) = 11$. What is the average rate of change of $f(x)$ over the interval $-3 \leq x \leq 9$?

$$y = -7 \quad y = 11$$

$$(-3, -7)$$

$$(9, 11)$$

(1) $\frac{1}{3}$

(3) 3

(2) $\frac{3}{4}$

(4) $\frac{3}{2}$

$$\frac{\Delta y}{\Delta x} = \frac{-7 - 11}{-3 - 9} = \frac{-18}{-12} = \frac{18}{12} = \frac{3}{2}$$

You studied exponential functions extensively in Common Core Algebra I. Today's lesson will review many of the basic components of their graphs and behavior. Exponential functions, those whose exponents are variable, are extremely important in mathematics, science, and engineering.

b is base

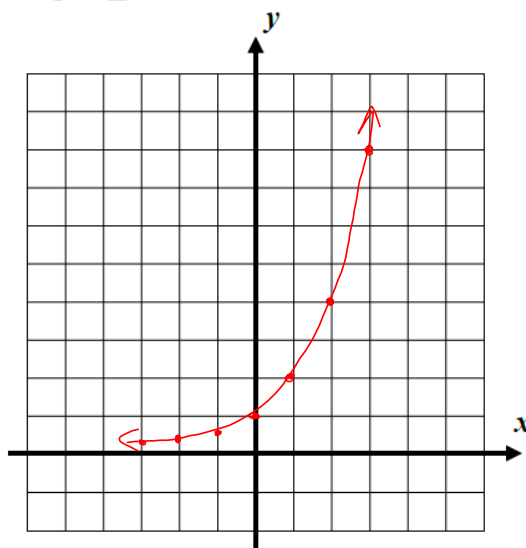
BASIC EXPONENTIAL FUNCTIONS

$$y = b^x \text{ where } b > 0 \text{ and } b \neq 1$$

*variable
in exponent*

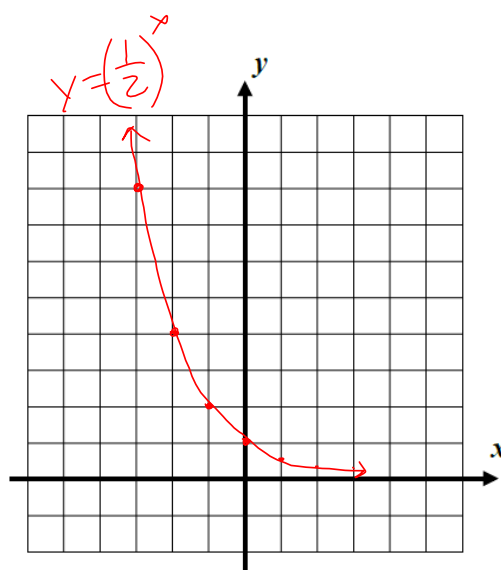
Exercise #1: Consider the function $y = 2^x$. Fill in the table below without using your calculator and then sketch the graph on the grid provided.

x	$y = 2^x$
-3	$\frac{1}{8}$
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4
3	8



Exercise #2: Now consider the function $y = \left(\frac{1}{2}\right)^x$. Using your calculator to help you, fill out the table below and sketch the graph on the axes provided.

x	$y = \left(\frac{1}{2}\right)^x$
-3	8
-2	4
-1	2
0	1
1	$\frac{1}{2}$
2	$\frac{1}{4}$
3	$\frac{1}{8}$



Exercise #3: Based on the graphs and behavior you saw in Exercises #1 and #2, state the domain and range for an exponential function of the form $y = b^x$.

Domain (input set):

$$(-\infty, \infty)$$

All Real
Numbers

Range (output set):

$$(0, \infty)$$

$$y > 0$$

Exercise #4: Are exponential functions one-to-one? How can you tell? What does this tell you about their inverses?

yes are 1 to 1

b/c they pass VLT and HLT

Exercise #5: Now consider the function $y = 7(3)^x$.

- (a) Determine the y-intercept of this function algebraically.
Justify your answer.

$$\rightarrow x = 0$$

$$y = 7(3)^0$$

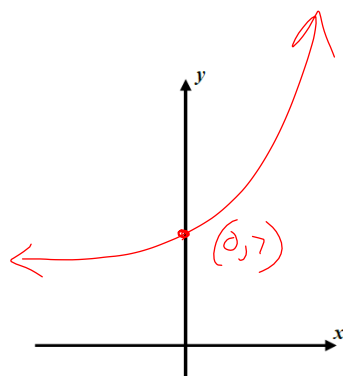
$$y = 7(1)$$

$$y = 7$$

- (b) Does the exponential function increase or decrease?
Explain your choice.

Increasing b/c the base
is greater than 1.

- (c) Create a rough sketch of this function, labeling its y-intercept.



Exercise #6: Consider the function $y = \left(\frac{1}{3}\right)^x + 4$.

(a) How does this function's graph compare to that of

$y = \left(\frac{1}{3}\right)^x$? What does adding 4 do to a function's graph?

Shift up 4 units

(b) Determine this graph's y -intercept algebraically. Justify your answer.

$$x = 0$$

$$y = \left(\frac{1}{3}\right)^0 + 4$$

$$y = 1 + 4$$

$$y = 5$$

(c) Create a rough sketch of this function, labeling its y -intercept.

